Groundwater Update

Brookhaven National Laboratory

Review of Plumes, Treatment Systems, Performance and Progress

Update on Peconic River Area WC-06 Sediment Cleanup

Presentation to Community Advisory Council
September 14, 2017

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Groundwater Protection Group

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Office of Science
U.S. DEPARTMENT OF ENERGY

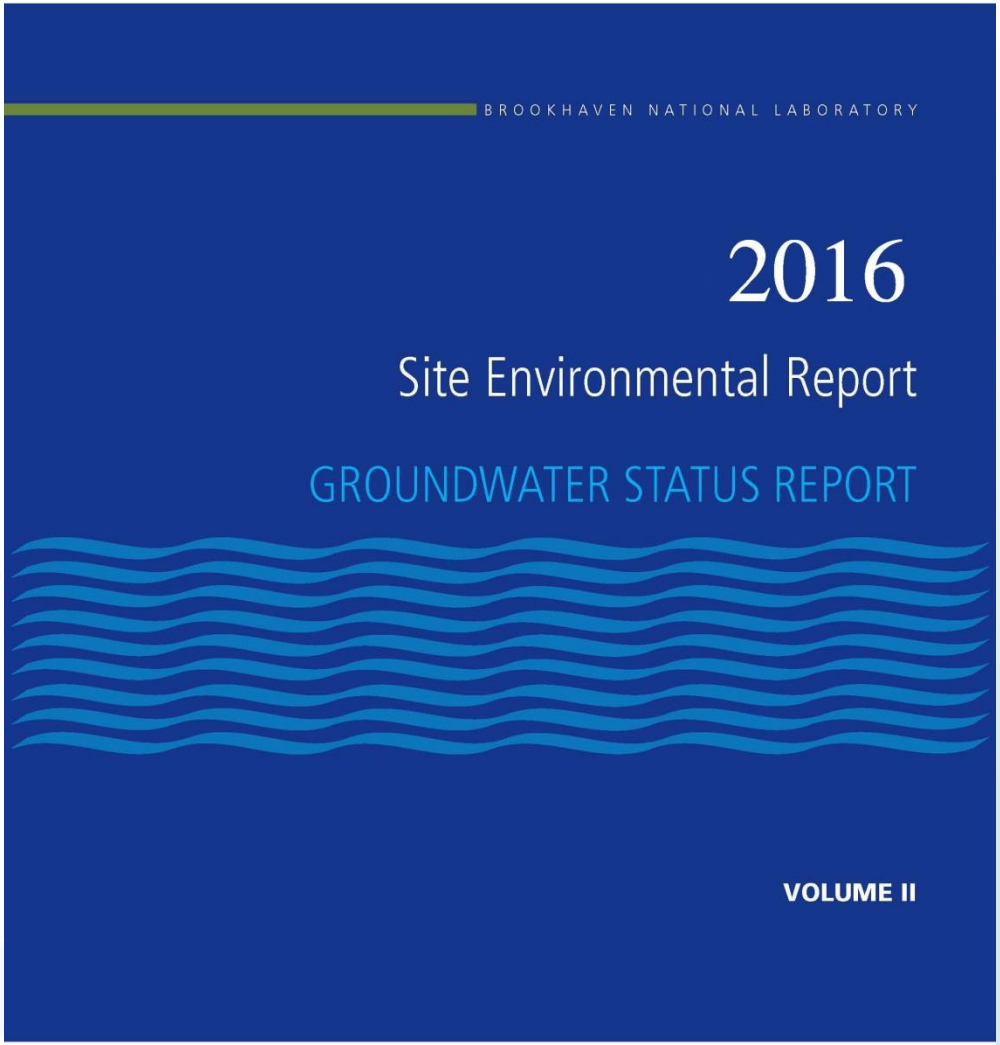
Agenda

- General Status of Plumes and Remediation Systems/System Optimization
- Upcoming system shutdown/decommissioning and ongoing work
- Update on Peconic River Area WC-06 sediment cleanup

Groundwater Status Report (Volume 2 of Site Environmental Report)

- Presentation provides up to date status on groundwater cleanup program progress
- Web link for 2016 Groundwater Status report:

  https://www.bnl.gov/gpg/gw-reports.php



Facility Monitoring

Groundwater monitoring at active research and support facilities:

- 120 monitoring wells
- DOE required groundwater surveillance
  - Accelerator Facilities (AGS, BLIP, RHIC, NSLS-II)
  - Underground gasoline storage tanks
- NYS permit required groundwater surveillance
  - Waste Management Facility
  - Sewage Treatment Plant Recharge Basin Area
  - Major Petroleum Storage Facility (Above Ground Storage Tank Area)

No new impacts detected during 2016

Groundwater Treatment Systems/Plumes Status

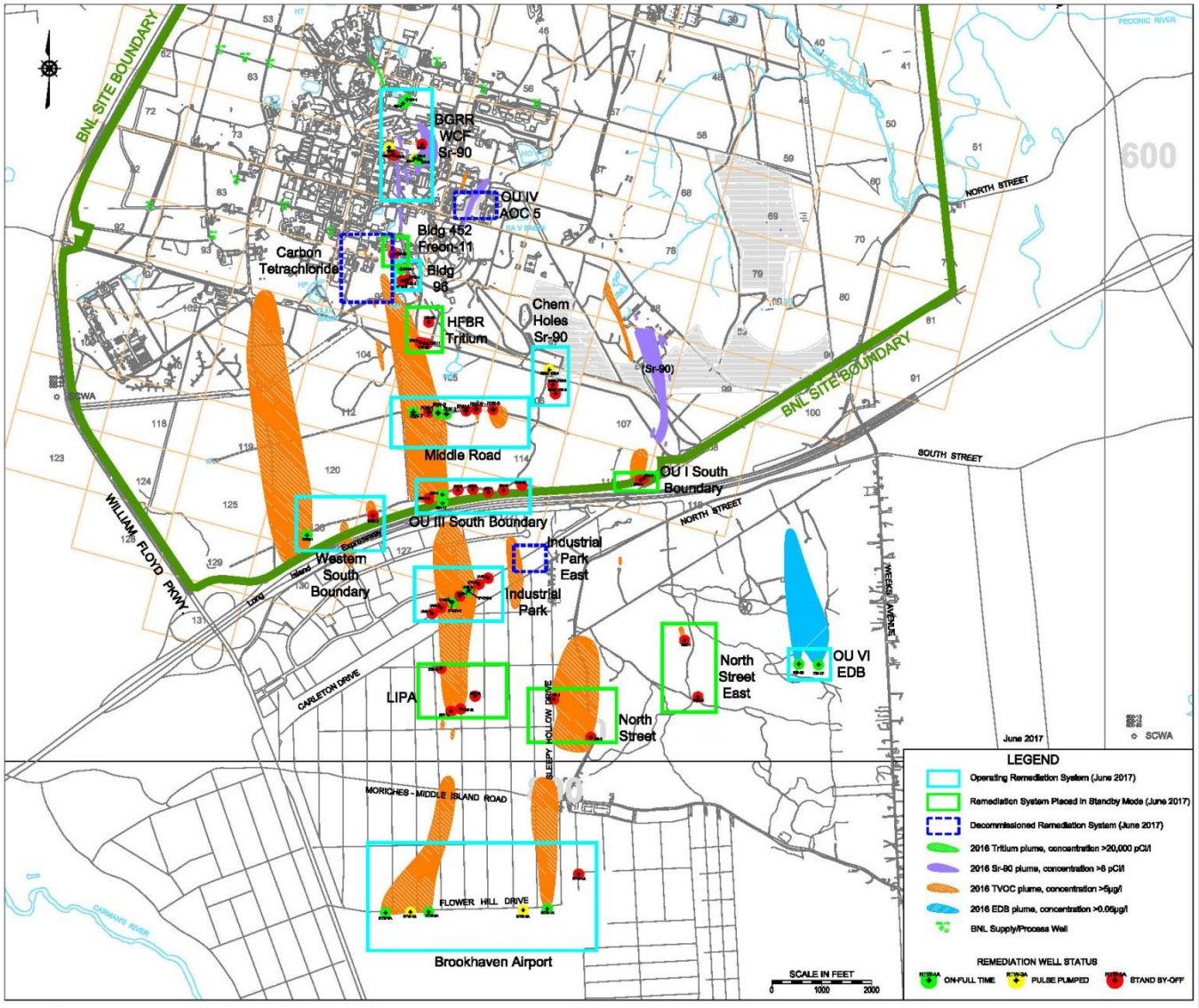
12 systems operating

3 systems approved for shut-down

3 systems decommissioned

1996 – 2016:

- 26 billion gallons of contaminated groundwater treated and recharged to the aquifer
- 7,455 lbs. VOCs removed
- 32 mCi Sr-90 removed



Groundwater Treatment System Status

Treatment System	Original Design Shutdown Date	Shutdown Date (Actual/Projected)	Total Number of Extraction Wells	Extraction Wells Currently Operational	Overall System Status	2016 Report Recommendation
OU I S. Boundary	2011	2013 A	2	0	Shutdown	Decommission
Carbon Tet	2004	2004 A	2	0	Decommissioned	
Bldg. 96	2005	2018	4	1	Operational	
Bldg. 452 Freon-11	2016	2016 A	1	0	Shutdown	
OU 3 Middle Rd.	2025	2025	7	3	Operational	
OU 3 S. Boundary	2011	2019	8	2	Operational	
OU 3 Western South Boundary	2014	2019[a]	2	1	Operational	Evaluate deep VOCs
OU 3 Industrial Park	2012	2013A/2020	9	2	Operational[b]	
OU 3 Industrial Park E.	2009	2010 A	2	0	Decommisioned	
OU 3 North St.	2012	2013 A	2	0	Shutdown	Decommission
OU 3 North St. E.	2013	2014 A	2	0	Shutdown	Monitor EDB
OU 3 LIPA	2014	2019	4	0	Shutdown	
OU 3 Airport	2014	2021	6	5	Operational	
Magothy[c]	--	--	--	--	--	
OU IV AS/SVE	2001	2003 A	AS/SVE	0	Decommisioned	
OU 6 EDB	2015	2019	2	2	Operational	
HFBR Pump and Recharge	2012	2013 A	4	0	Shutdown	Decommission
Chemical Holes Sr-90	2015	2019	3	1	Operational	Shutdown Petition
BGRR Sr-90	2015	2026	9	7	Operational	Extraction wells in standby/pulsed pumping

Notes-

A - Actual

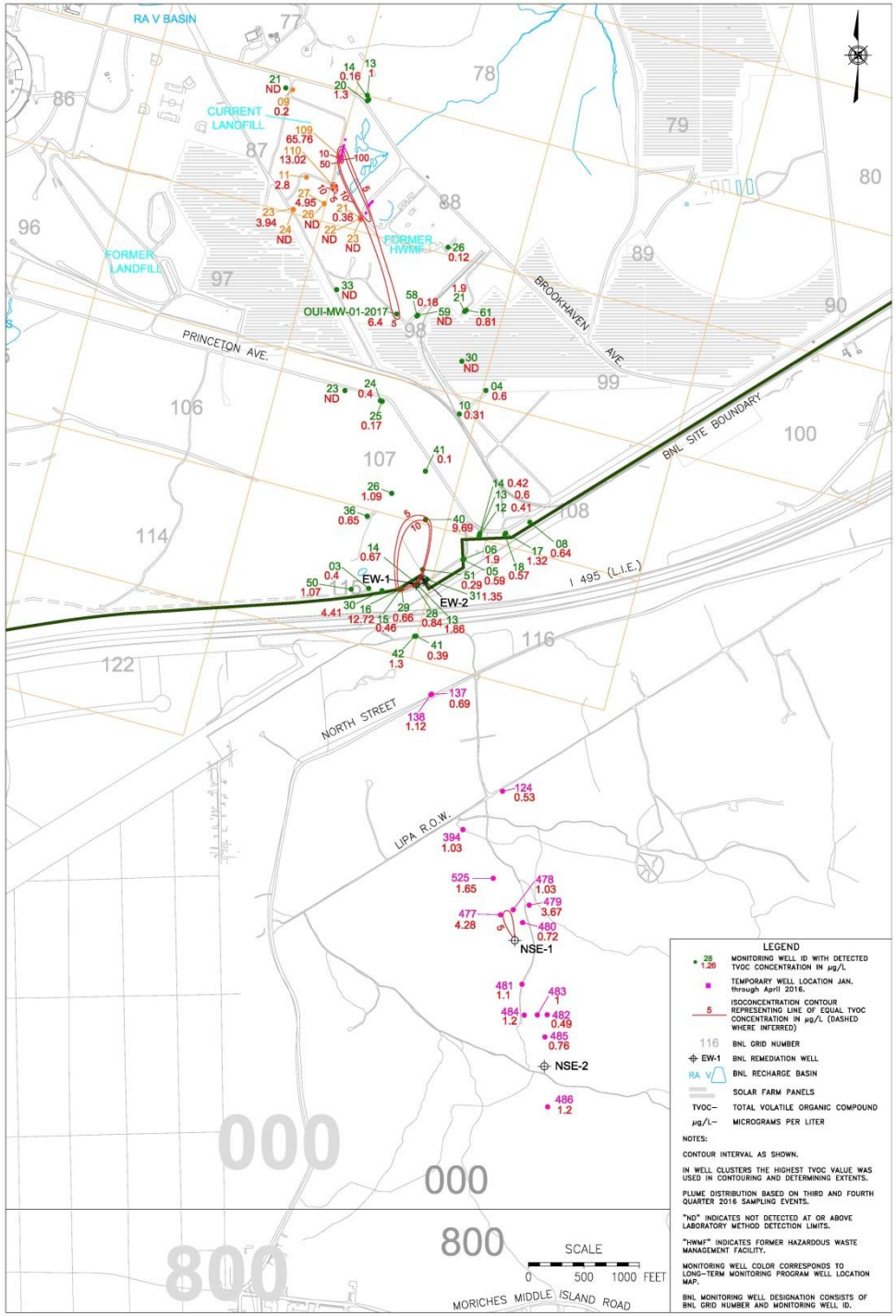
[a] Existing system is scheduled for shutdown in 2019. The need for treatment of the deeper VOCs is currently being evaluated.

[b] Upper Glacial system was approved for shutdown in 2013. Four wells were restarted from 2014 through 2016 due to VOC rebound. Four new Magothy wells in full operation.

[c] Magothy wells are integrated into other treatment systems.

OU I S. Boundary

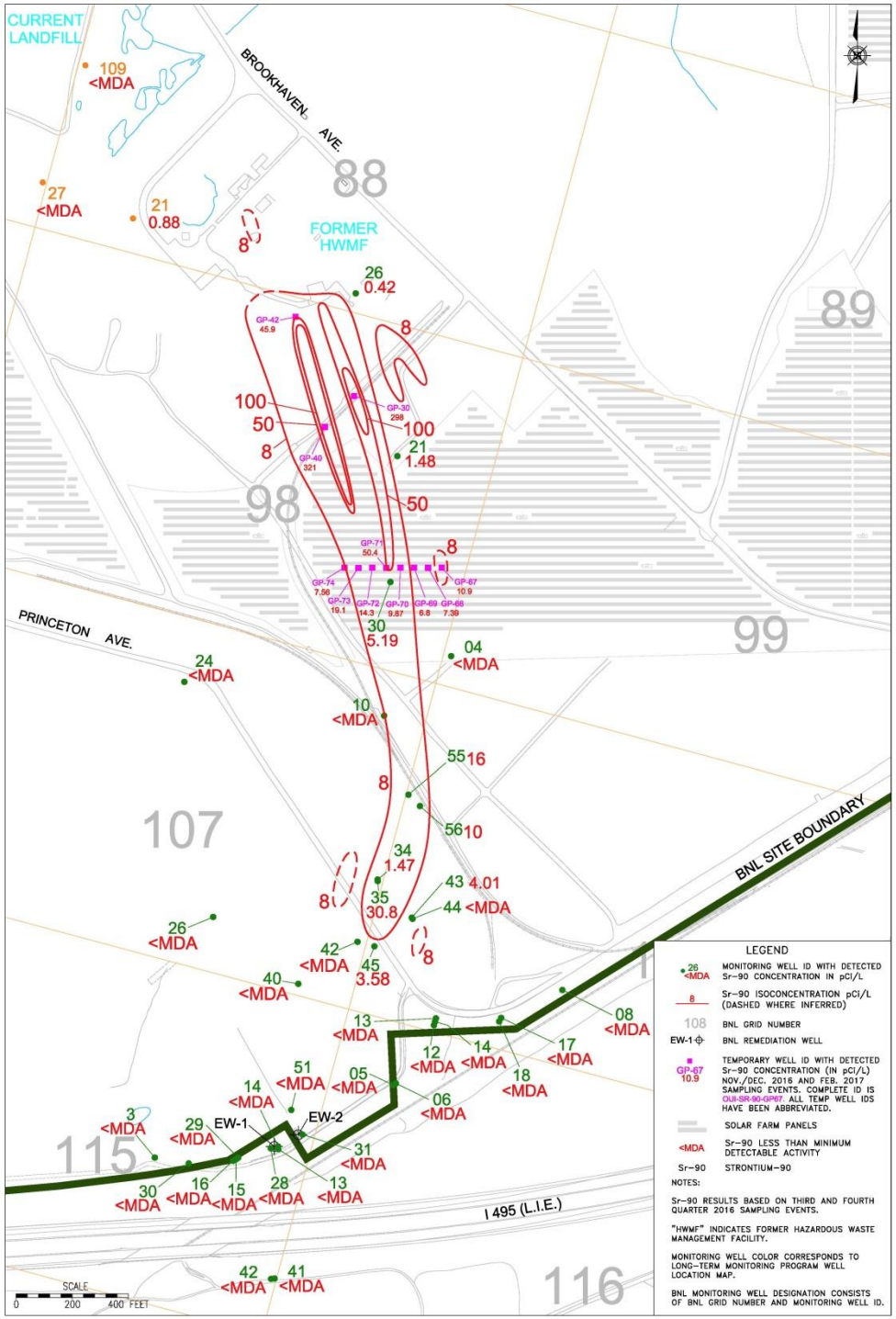
- Maintain the system in standby mode (shut down July 2013).
- Submit a petition to decommission the OU I South Boundary Treatment System.
- Reduce monitoring to annual sampling from select core wells.



OU I South Boundary

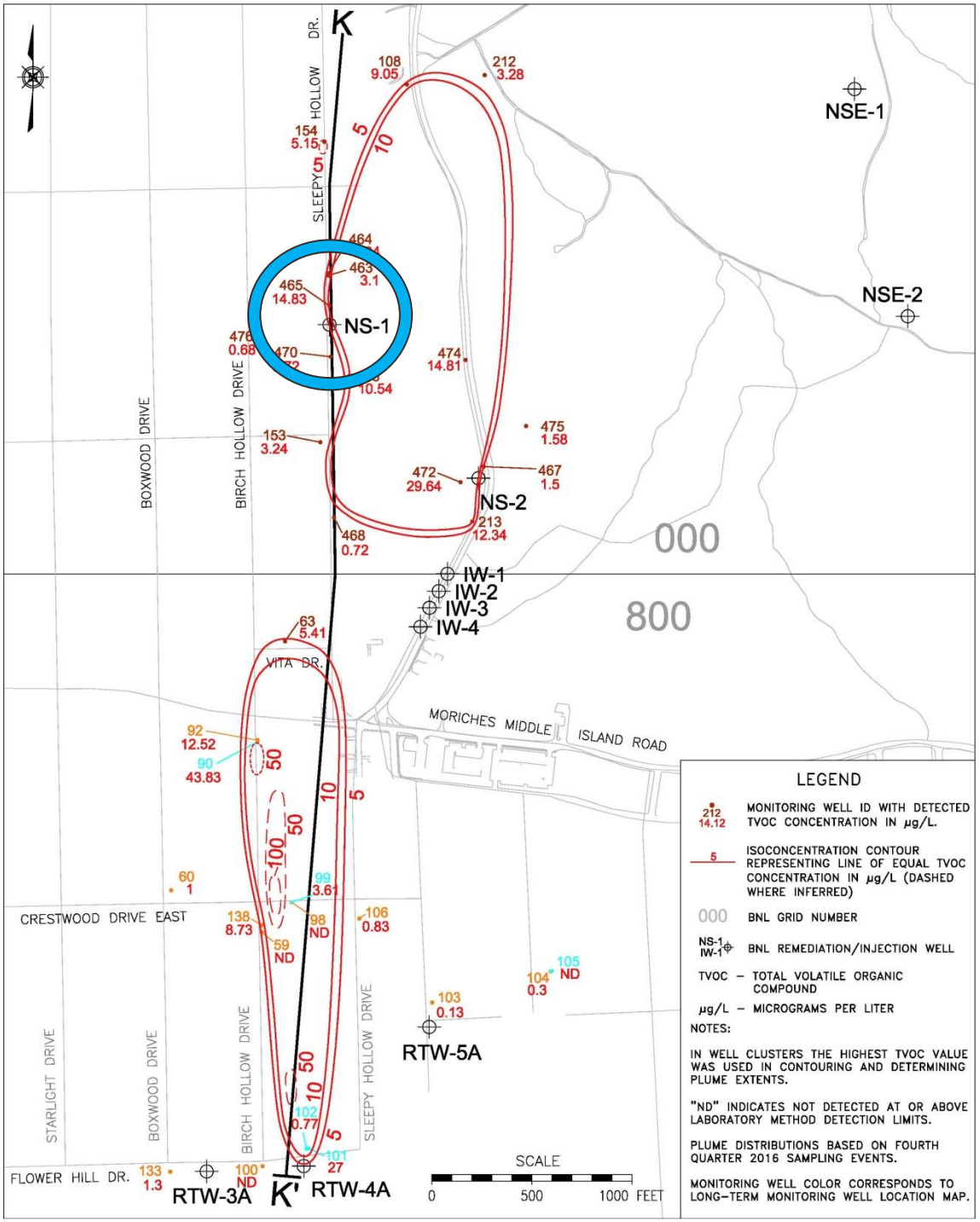
OU I South Boundary

- Monitor the downgradient migration of high Sr-90 concentration area utilizing temporary wells. This supplemental monitoring will continue through 2021 (as per the Five Year Review), followed by a comparison of monitoring data to model simulations in order to evaluate the accuracy of the simulations.
- Install several temporary wells as necessary in the vicinity of Sr-90 sentinel monitoring wells 107-35 and 108-45 to evaluate the resulting shift in the Sr-90 migration path.



OU III North Street

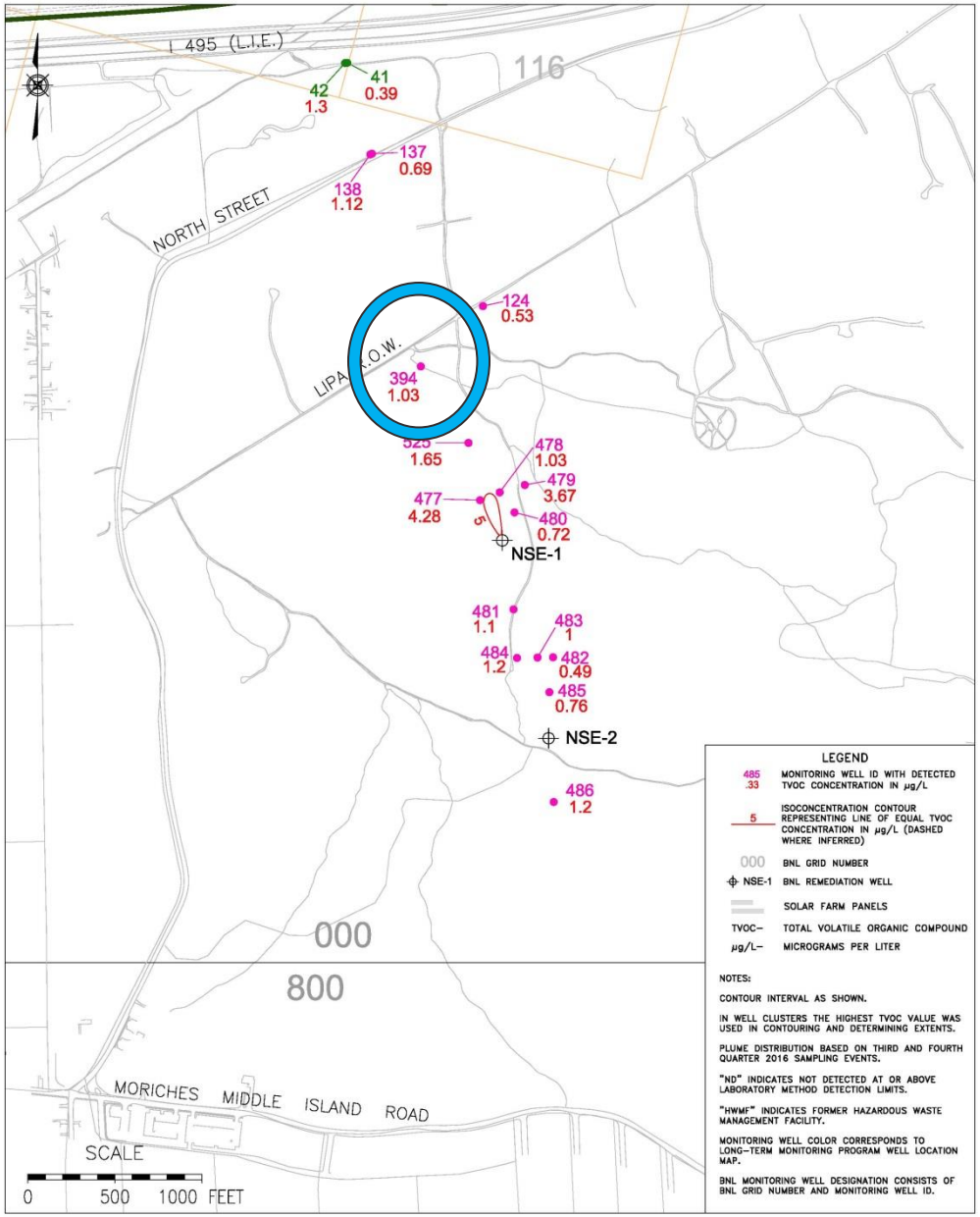
- System began operation in 2004. Extraction wells NS-1 and NS-2 in stand-by mode since 2013
- Plan to submit petition to decommission system in 2018
- Recent detection of 126 ug/L TVOC (August 15, 2017) in monitoring well 000-465
- Resampled the well on August 30 and the TVOC concentration was 8 ug/L.



OU III North Street East

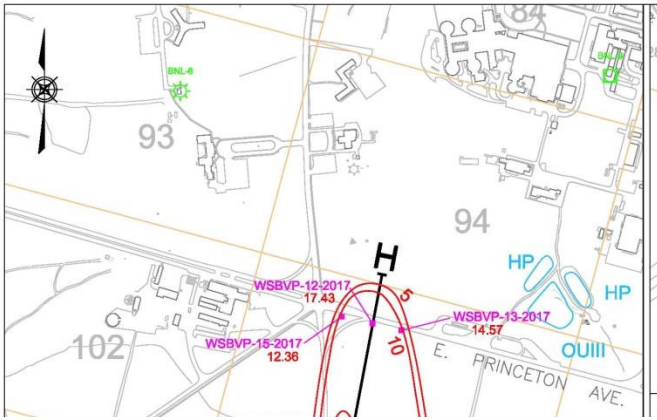
- System began operation in 2004. Treatment system in standby mode since shutdown in June 2014
- EDB first detected in well 000-394 in August 2015 (Drinking Water Standard of 0.05 ug/L)
- Evaluating need to conduct characterization to determine extent of EDB in this area

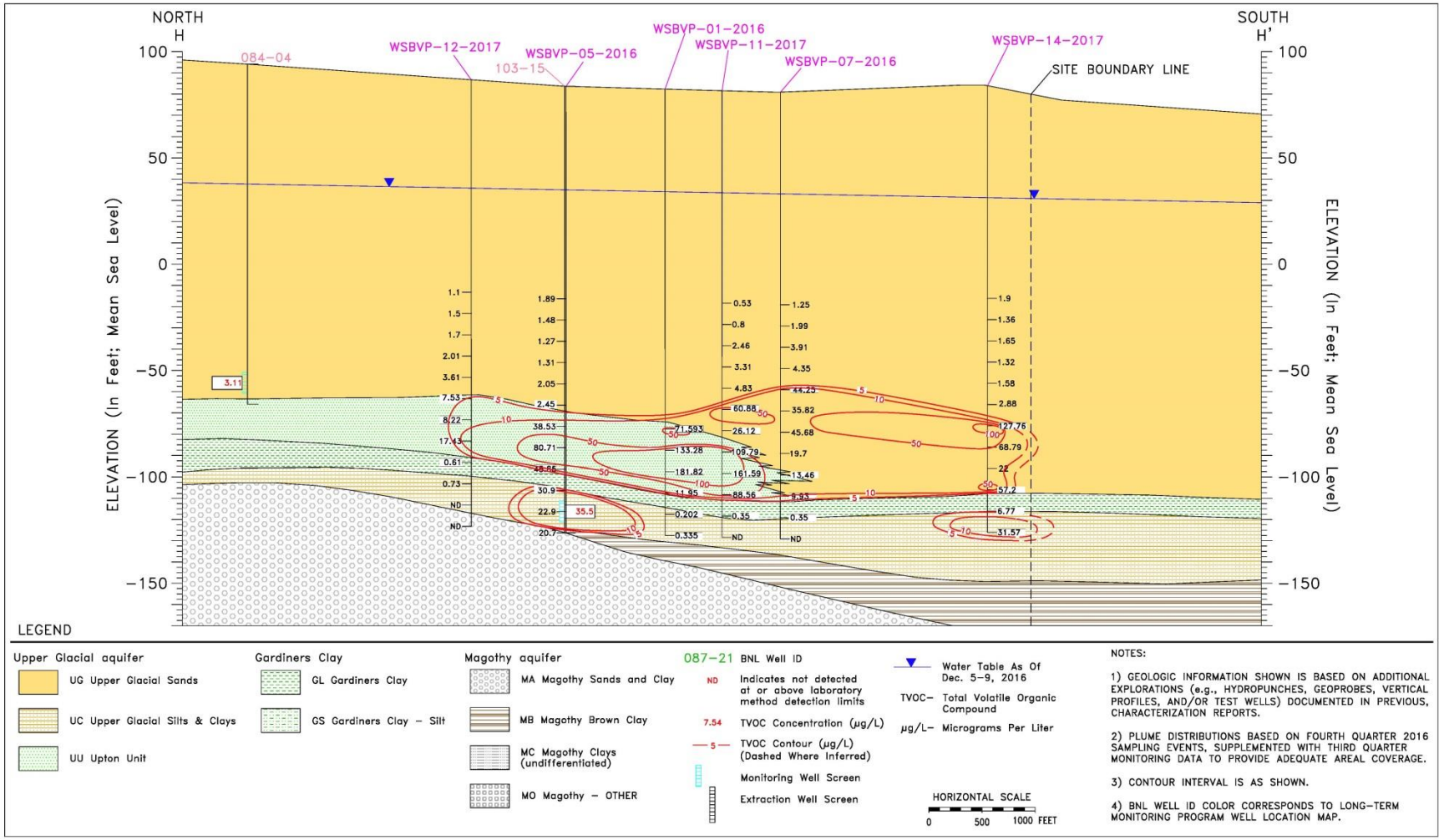
Sample Date	Value	Detection Limit	Units	Lab Qualifier	Method
5/6/2015	0.5	0.5	UG/L	U	524.2
8/12/2015	0.38	0.5	UG/L	J	524.2
11/19/2015	0.49	0.5	UG/L	J	524.2
4/15/2016	0.679	0.0811	UG/L		504.1
5/20/2016	0.785	0.0808	UG/L		504.1
8/8/2016	0.553	0.0796	UG/L		504.1
11/18/2016	0.276	0.0395	UG/L		504.1
1/25/2017	0.695	0.079	UG/L		504.1
4/17/2017	0.77	0.101	UG/L		504.1
7/17/2017	0.677	0.0957	UG/L		504.1



OU III Western South Boundary

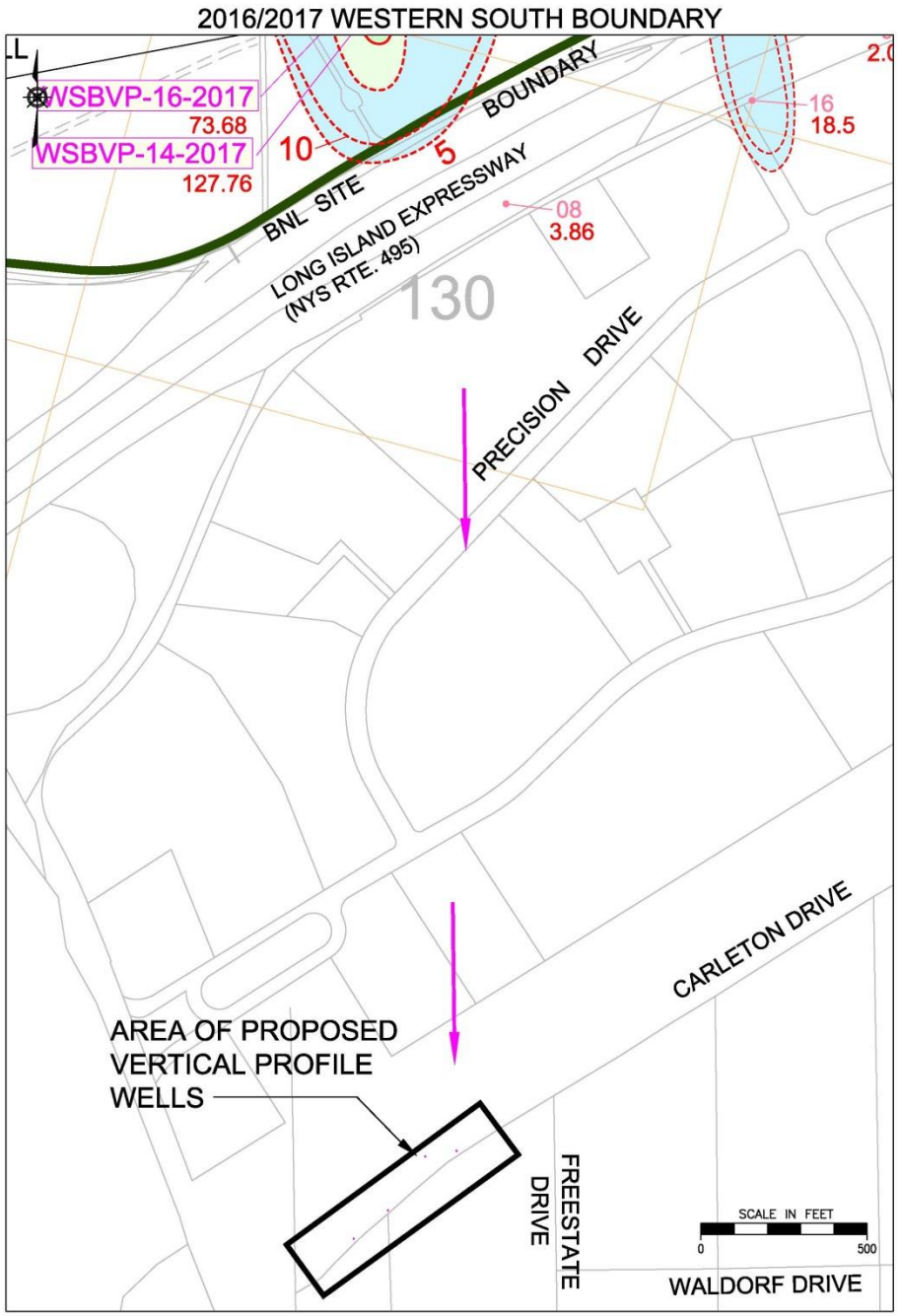
- Last updated CAC June 2017
- Characterized on-site extent of VOCs (TCA, DCE, Freon-12)





OU III Western South Boundary

- Currently installing 4 vertical profile wells located along an east-west transect along Carleton Dr. in E. Yaphank to depths of ~250 feet below ground surface.
- Canvassed homes surrounding drilling location area to discuss upcoming sampling.
- Evaluate sample results and determine whether additional data are needed.
- Model the attenuation of the deeper VOCs and evaluate migration/attenuation of the plume and ability to meet the cleanup goal of drinking water standards.

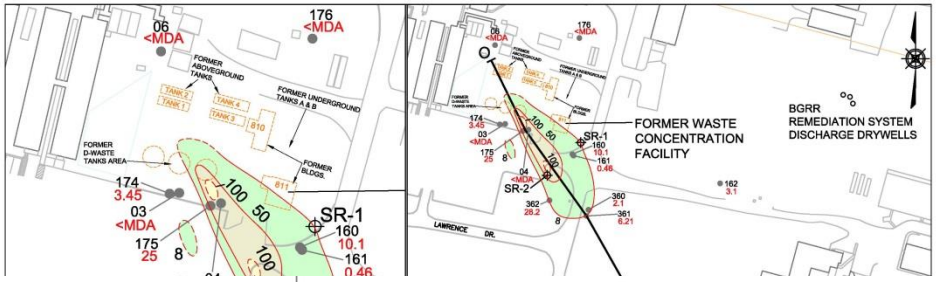


OU III Chemical / Animal Holes

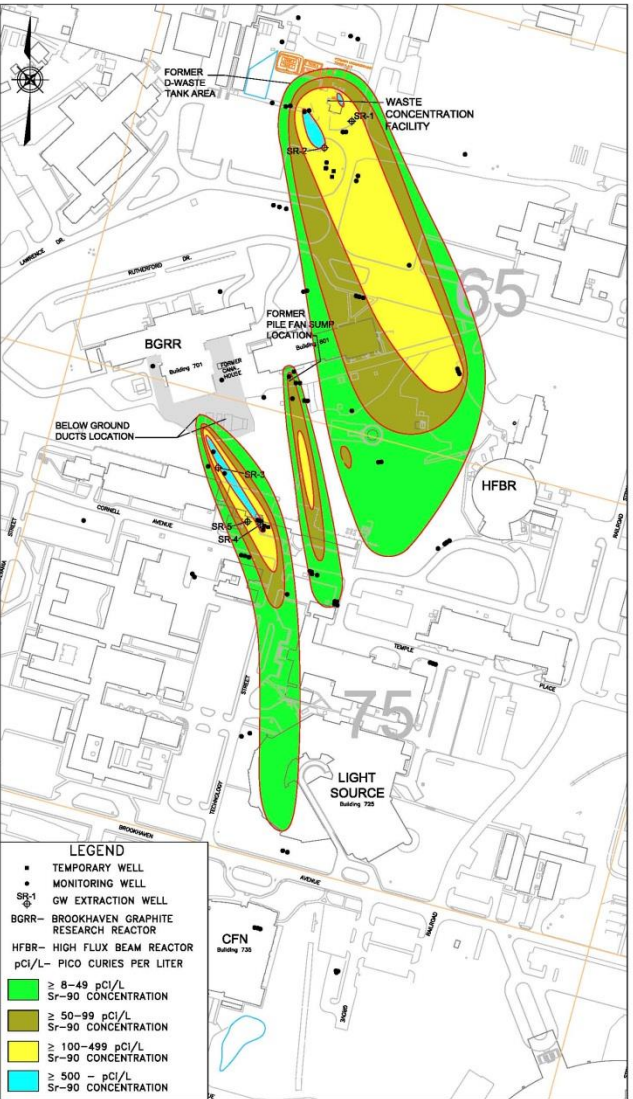
- Treatment system began operation in 2003. Due to the low Sr-90 concentrations observed in the monitoring wells since mid-2015, a petition for shutdown will be submitted to the regulators in the fall of 2017.
- Until approval of the petition for shutdown is approved by the regulators, continue to operate extraction well EW-1 in pulsed pumping mode (one month on and one month off) and maintain EW-2 and EW-3 in standby.

OU III BGRR/WCF Sr-90

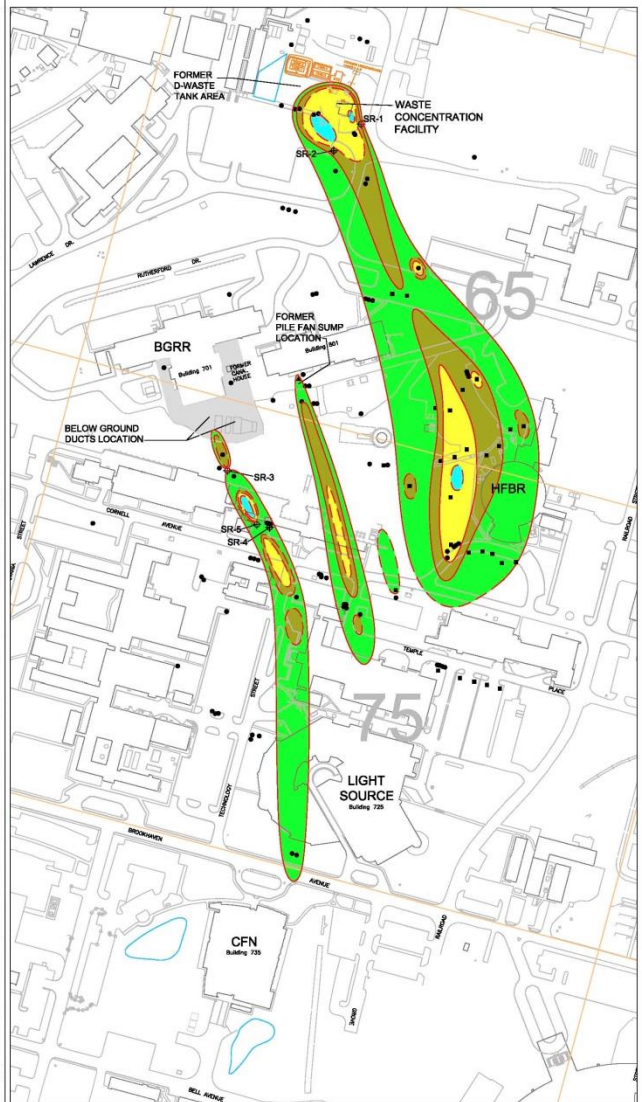
- Placing extraction well SR-6 in standby mode due to low Sr-90



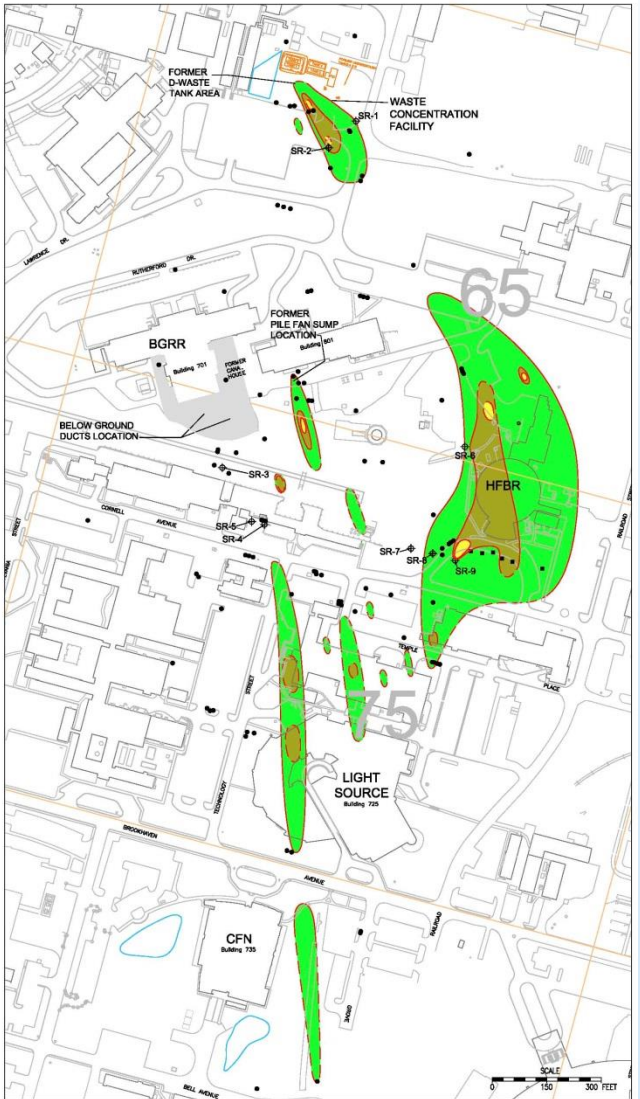
2004



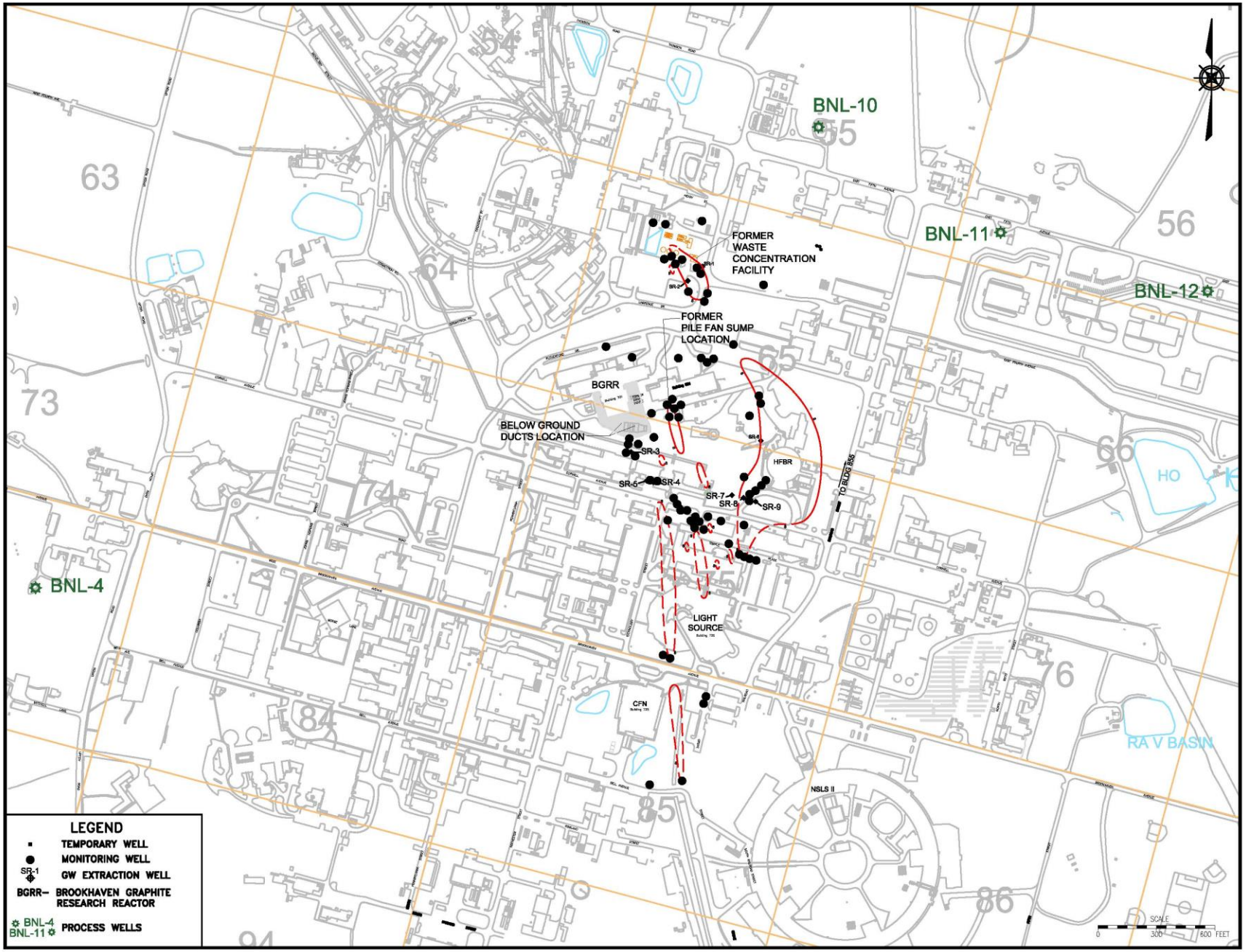
2008



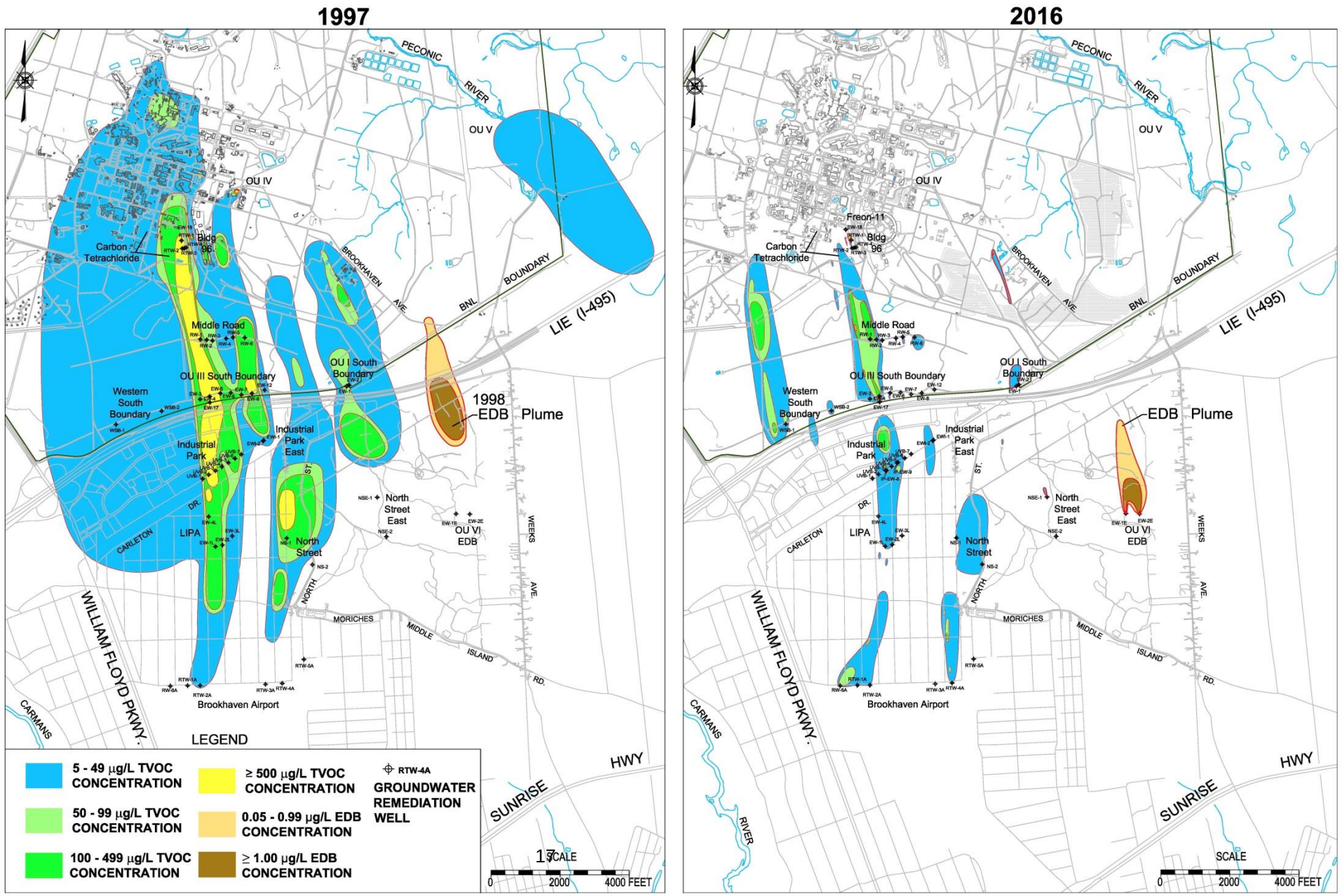
2016

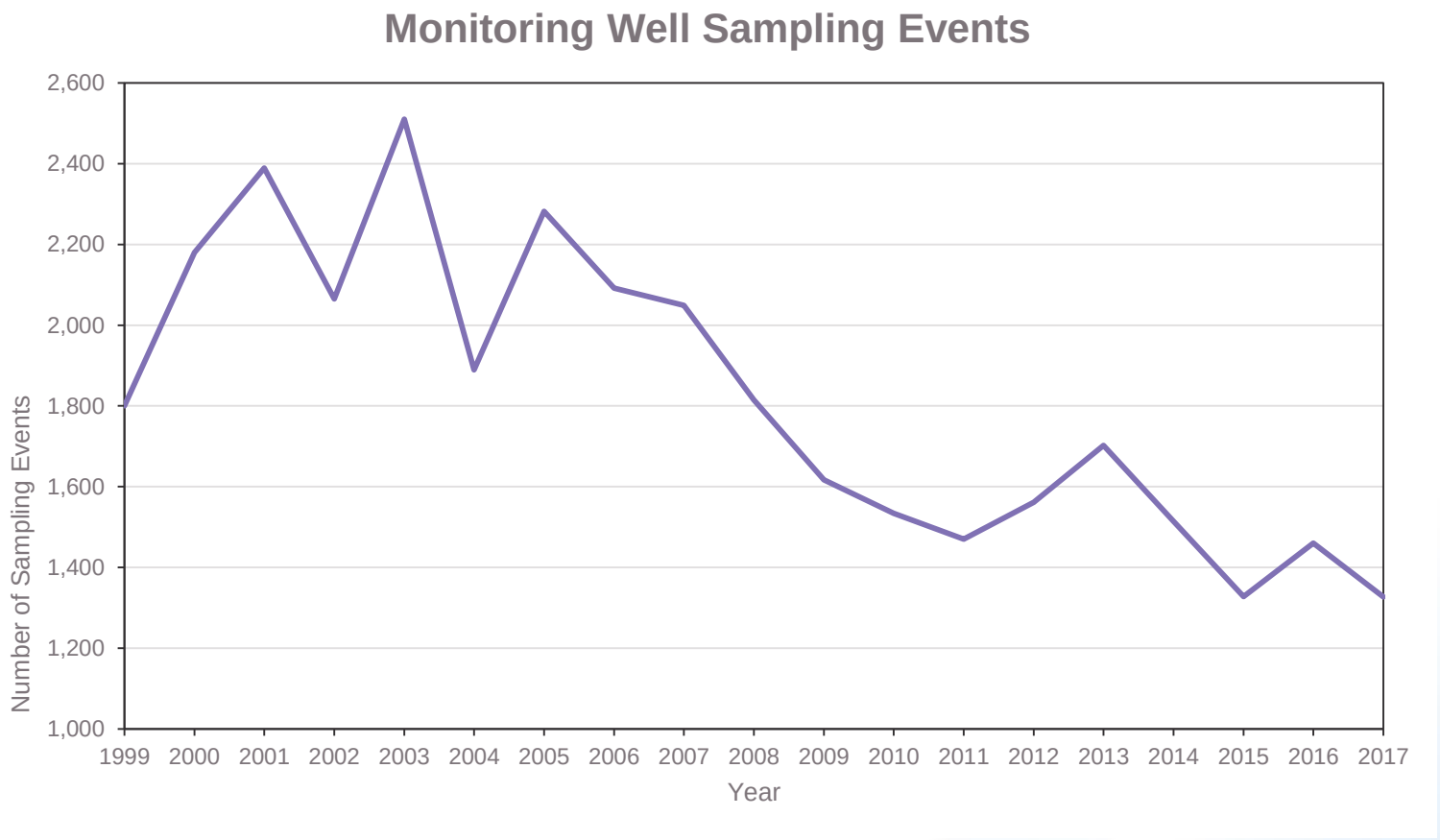


OU III BGRR/WCF Sr-90



VOC Remediation Progress 1997 to 2016





- Reduced number of monitoring wells and groundwater samples obtained over time as cleanup program progresses.
- Sampled 547 monitoring wells in 2016, down from peak of 740 wells
- Sampling events reduced by approximately 130 for 2018 program


Questions?

Peconic River Area WC-06 - Sediment Cleanup Status

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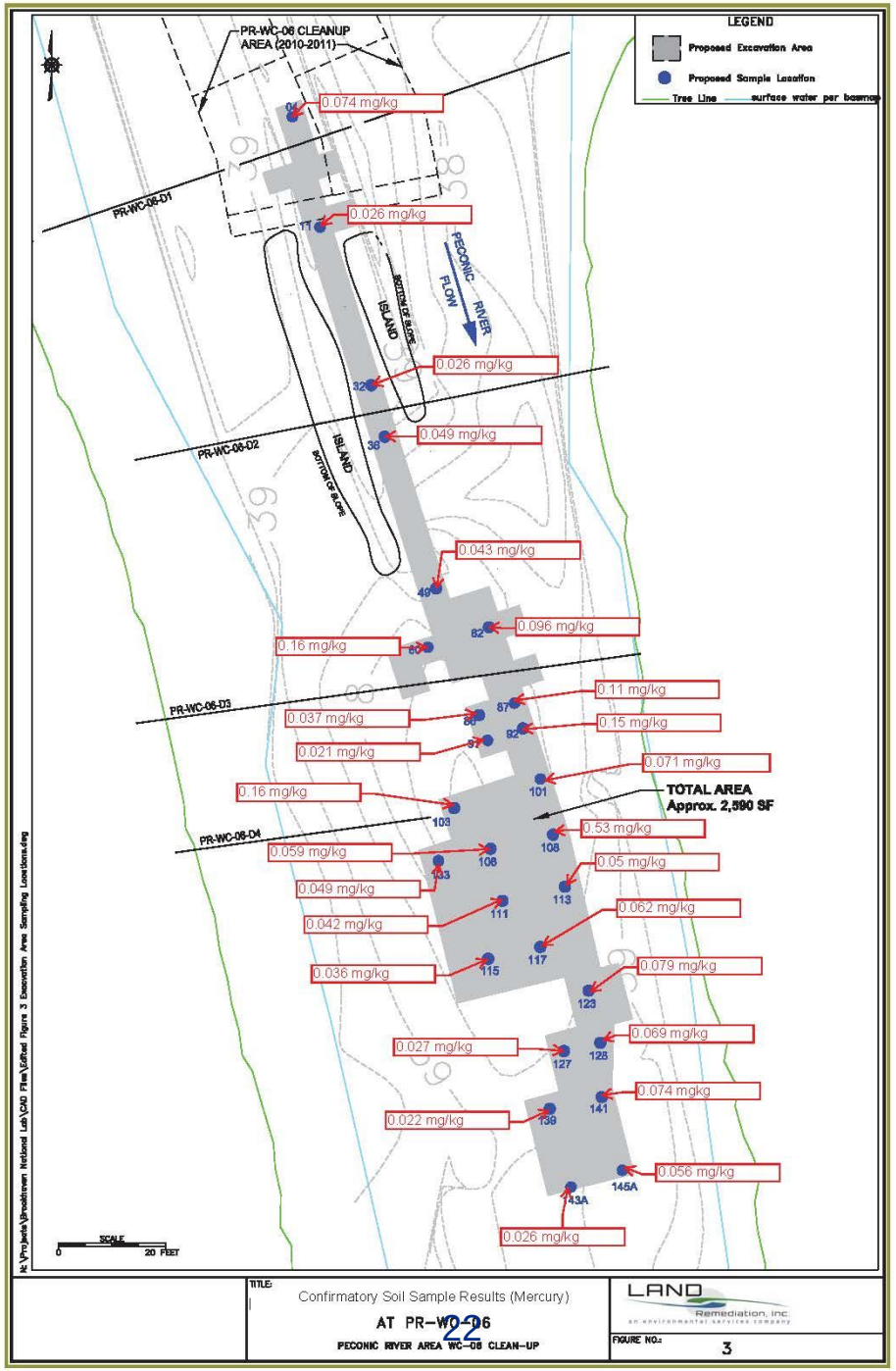
- Last CAC update - May 2017
- Equivalency permit application for working in the river approved by NYSDEC – June
- Work Plan and Quality Assurance Project Plan approved by regulators
- LAND Remediation Inc. installed well point dewatering system as a precaution, but was not used due to low groundwater levels
- LAND performed sediment excavation from July 18th through 21st. Excavation depth ranged from 8 inches (downstream) to 24 inches (upstream). About 150 cubic yards excavated. River was dry.
- All 27 confirmatory samples met the cleanup goal for mercury (average of less than 1.0 mg/kg, and all samples less than 2.0 mg/kg).
  - Maximum detection was 0.5 mg/kg.

Looking Downstream

Before

During

After



Peconic River Area WC-06 - Sediment Cleanup Status

- Cleanup area was seeded and erosion control jute matting installed early August, per equivalency permit.
  - NYSDEC performed site inspection August 2nd
- Draft Completion Report is under internal review.
- Restoration and monitoring (up to five years) to demonstrate re-establishment of wetland plants, and control of invasive species

Area WC-06

Looking Upstream, Before Cleanup

Looking Upstream, After Cleanup

NYSDEC Site Inspection, August 2nd

Transfer of Waste for Temporary Indoor Storage

Peconic River Area WC-06 - Sediment Cleanup Status

- 22 super sacks of sediment waste are temporarily stored at the Waste Management Facility prior to final disposal
- Final disposal will be at a DOE-approved off-site facility


Questions?

BACKUP

Groundwater Treatment System Completion Process

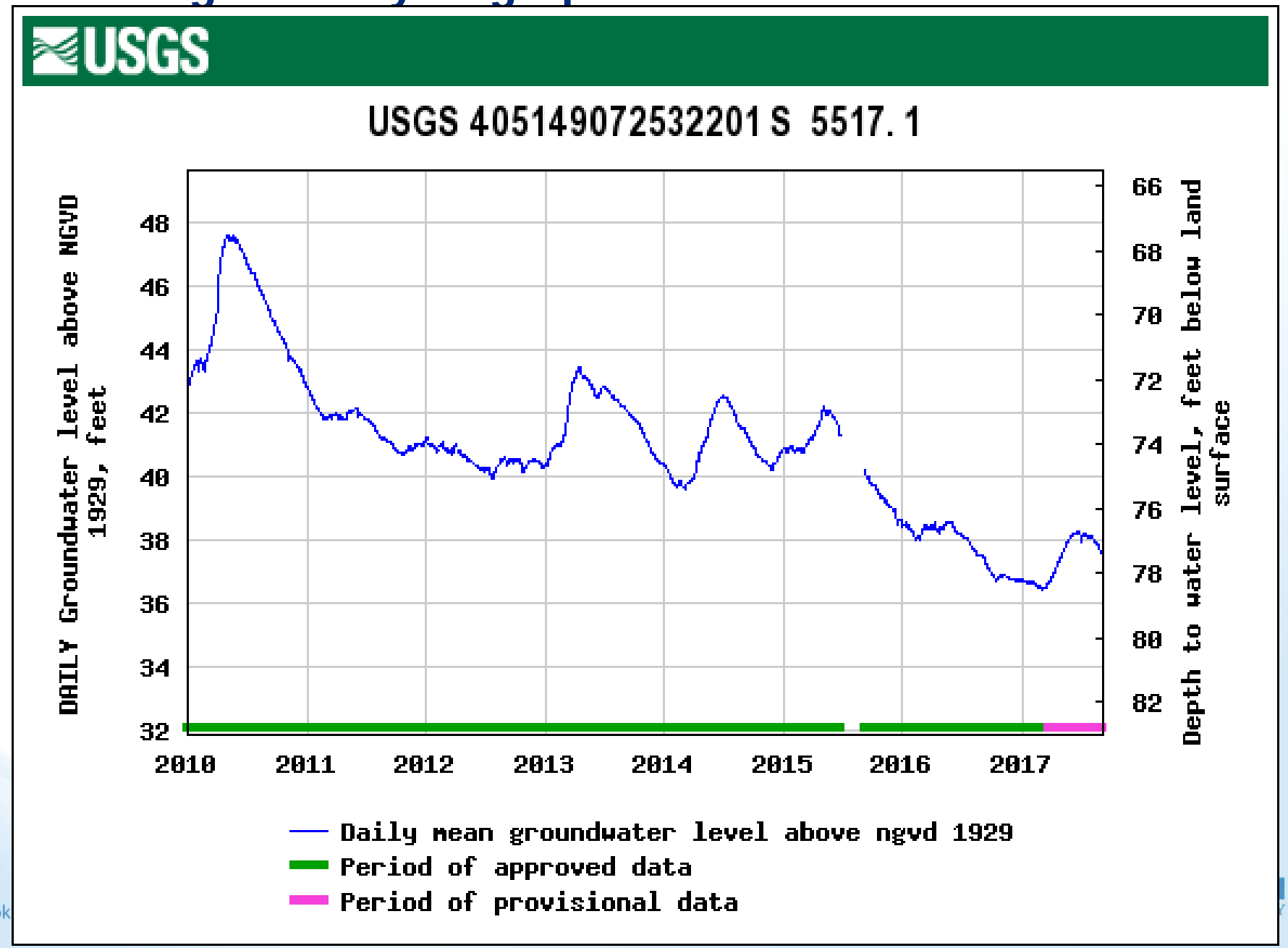
Achieve plume capture goal for system (typically < 50 µg/L Total VOC (TVOC) in monitoring and extraction wells)

Petition Regulators for system shutdown

Upon approval, turn extraction wells off and maintain in standby mode/sample wells for several years

When rebound in VOC concentrations if present has ceased, petition Regulators for system closure (upon approval, decommission equipment, abandon wells, limited continued monitoring)

Long Term Hydrograph of Water Table at BNL



Extraction Well Status

- Systems are routinely evaluated for optimization.
- A number of operating systems have individual extraction wells on standby
- In some cases we will restart one or more extraction wells for systems that have been shut down based on monitoring results showing rebounding concentrations.
    - Example – Industrial Park